

## SPERMATOCELE

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SPERMATOCELE is accepted to-day as meaning a retention cyst of the scrotum, containing spermatozoa, and arising either from the vas efferentia, the canal of the epididymis, or from the embryonic remnants around and about the testicle and lower end of the cord. Like many other medical terms, it is not quite exact, for it is claimed that spermatocele can exist without spermatozoa, and furthermore there are a few cases on record in which the cyst extended beyond the external inguinal ring. In view of the varied opinions as to the genesis and etiology it would be better to define it as a cyst originating in the scrotum and which is, or has been, in communication with the semen-carrying system.

The term spermatocele appears to have been primarily employed by Guerin in 1785 in reporting an obscure inflammatory condition of the testicle, which in no way bore any resemblance to what is now recognized as spermatocele. In the literature of that period these cysts were doubtless diagnosed as encysted hydroceles.

In April, 1843, Liston wrote an article, the title of which was "Some Observations on Encysted Hydrocele." In this article he mentioned two cases in which the fluid withdrawn from these sacs contained spermatozoa. Two months later Lloyd reported three similar cases, the first of which was revealed when he was using some fluid from an "encysted hydrocele" to dilute blood for microscopical examination. These findings were confirmed by Paget, Curling, Sedillot, Gosselin and others, and though these proofs seemed to point toward a pathological entity, the term encysted hydrocele survived until 1860, when Cavasse used the term spermatocele as applying to cysts containing spermatozoa. The subsequent studies of this condition were conducted chiefly by the French and Germans, and to Dolbeau, Hanusa, Kocher, Luschka, Hochenegg, and von Hoffman we owe much of the information which we possess.

The American literature is very scanty on the subject. Ellis, in 1858, reported the finding of spermatozoa in hydrocele fluid. From that date until 1876 we find no further reports; in the latter year, Dr. William Hunt and Dr. John B. Roberts reported a case which had been diagnosed as hydrocele, but on aspiration they found the fluid was of a milky color, and the microscopical examination showed spermatozoa. Following the above records only an occasional report is found until 1907, at which time Whitney published a thorough review of the literature, and then comes a hiatus which extends to the present year.

To understand the origin and etiology of spermatocele, a review of the

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relation of the epididymis and testicle, and of the embryonic remnants to the epididymis and testicle is quite essential.

The testicle hangs suspended in a space, the *cavum vaginale*, from which it is separated by the visceral layer of the *tunica vaginalis*. The latter is continued on to the epididymis, at the lateral margins of which it is reflected forward as the parietal layer, and as this is more extensive than the visceral layer, the above-named cavity results. The testicle is enclosed in a thick capsule of fibrous tissue, the *tunica albuginea*. The *tunica albuginea* sends prolongations inwards, dividing the testicle into lobules. Each lobule contains the seminiferous tubules, extending from the base where they end blindly, towards the apex, at which point they unite

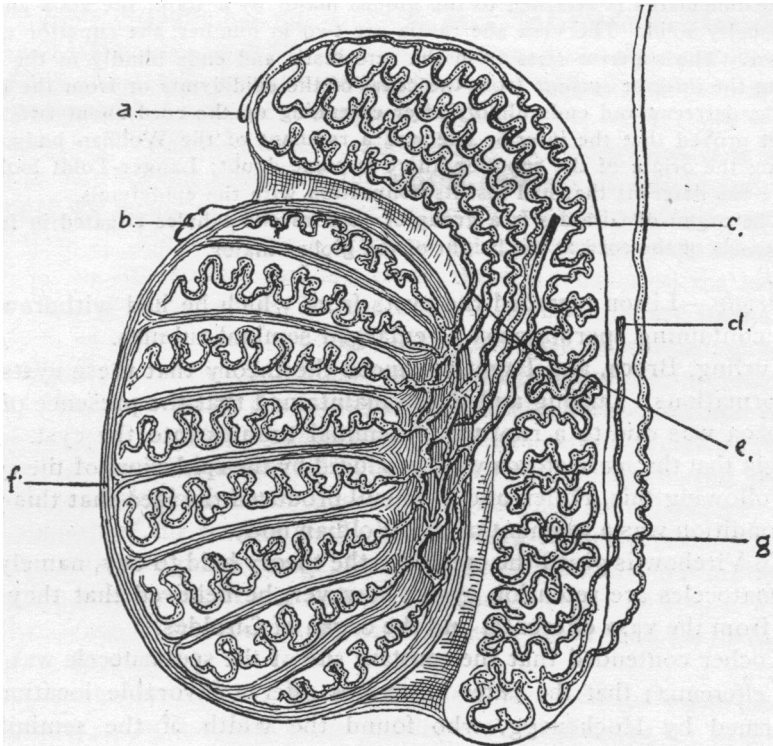


FIG. 1.—Diagrammatic sketch of relations of testicle, epididymis and embryonic remnants. *a*, pedunculated hydatid; *b*, hydatid of Morgagni; *c*, vasa aberrans superioris; *d*, vasa aberrans inferioris; *e*, vasa efferentia; *f*, testicle; *g*, epididymis.

to form the *tubuli recti*. The *rete testis* is formed in the *mediastinum testis* by the *tubuli recti*, and from it spring 12 to 15 *vasa efferentia*, which pierce the *tunica albuginea* and pass backwards in the *ligamentum epididymis superioris*, to form the *coni vasculosi* in the *globus major*. The canal of the epididymis arises from the *coni vasculosi* and at the cauda becomes the duct of the *vas deferens*.

The epididymis is attached to the testicle at three points by two-leafed folds of serous membrane, which are nothing more or less than the extension of the visceral layer of the *tunica vaginalis* on to the epididymis. The fold of the *globus major* is called the *ligamentum epididymis superioris*, and between its leaves pass the *vasa efferentia*. The double fold at the body encloses a space, the *saccus epididymis*. The *ligamentum epididymis inferioris* is the fold at the cauda.

There now remain to be considered the embryonic remnants, viz.: the hydatid of Morgagni, the pedunculated hydatid, the vasa aberrantia and the organ of Giralde.

The origin of the hydatids is still in dispute. Luschka claimed that the sessile hydatid arises from the upper Wolffian tubules and the pedunculated hydatid from the Mullerian ducts. Virchow and Kocher claim that the sessile is a remnant of the Mullerian ducts. Stohr believed that the pedunculated is a representative of the Wolffian body.

The sessile hydatid is found at the upper pole of the testicle close to the globus major, and it has been stated by Kocher, Hochenegg, Lewin, and Lusehka that there is a communication between the canal of the epididymis and hydatid. The pedunculated is attached to the globus major by a stalk; the stalk and head are usually solid. The vasa aberrantia are two in number, the superior and the inferior. The superior rises from the rete testis and ends blindly in the globus major; the inferior springs from the canal of the epididymis or from the duct of the vas deferens and ends blindly after extending up the cord about two inches. Kobelt proved that the inferior one was a remnant of the Wolffian body. Concerning the origin of the superior, there is some doubt; Langer-Toldt looked on it as a vas deferens that had lost its connection with the epididymis.

The organ of Giralde is a group of vesicles and tubules situated in front of the vessels of the cord at the height of the globus major.

*Origin.*—Liston regarded the cysts from which he had withdrawn the fluid containing spermatozoa as enlarged seminal tubules.

Curling, Broca, and Paget advanced the theory that these cysts were neoformations. Curling and Broca maintained that the presence of spermatozoa was due to a rupture of seminal tubules into the cyst. Paget thought that the spermatozoa were produced by the epithelium of the cyst.

Following this, Follen and Verneuil produced the idea that this peculiar condition was a remnant of the Wolffian body.

To Virchow is given the credit for the theory held to-day, namely, that spermatoceles are retention cysts; however, he believed that they arose only from the vasa efferentia and the organ of Giralde.

Kocher contended that the constant site of the spermatocele was at the vasa efferentia; that the latter structures offer a favorable location was confirmed by Hochenegg, who found the width of the seminiferous tubules to be 0.1–0.2 mm., that this diminishes to the size of the capillaries in the rete testis; in the vasa efferentia there is an expansion to 0.6 mm., followed by a contraction of 0.2 mm. in the coni vasculosi. This anatomical arrangement places the vasa efferentia between two obstructions, and as the testicle and globus major are covered with a dense capsule which would impede the formation of retention cysts, while the vasa efferentia are only surrounded by loose connective tissue, it is quite readily seen that dilatation of these ducts could easily occur. As a matter of fact, Dolbeau proved this experimentally by the injection of one hundred testicles with mercury, which caused a dilatation of the vasa efferentia.

The vas aberrans inferior has an origin similar to the vasa efferentia,

and since it has similar surroundings, together with the fact that it ends blindly, can be considered as a point predisposed to retention cysts. As far as the vas aberrans inferior, a retention cyst here would mean an obstruction of the duct of the vas.

If the hydatids or the organ of Giralde are in communication with the semen-carrying system, the origin of spermatocele from these areas is quite possible. However, since the organ of Giralde and the pedunculated hydatids are usually isolated, not very much credence can be put into any theory including these organs as the points of origin of spermatocele. From the clinical and anatomical data, it seems probable that the sessile hydatid is often involved.

Therefore, in summing up, it can be said that spermatoceles should arise most frequently from the vasa efferentia and vas aberrans superior, often from the sessile hydatid and only occasionally from the vas deferens, pedunculated hydatid and organ of Giralde.

*Causes*—1. *Trauma*.—Gosselin was the first to give trauma as a cause, and later Hochenegg described the *modus operandi* of this factor. According to the latter, on violent concussion, the testicle, which is more or less mobile, is able to descend, whereas the epididymis, which is fixed, cannot follow the motion, and as a result there is tension on the folds of the serosa, and as the tension increases the vasa efferentia are torn. This laceration, he states, usually occurs where the vasa efferentia pierce the tunica albuginea; the ends obliterate and blind pouches are formed. Another method is given by the same author, namely, that on account of the very free blood supply, trauma may cause sub-serous bleeding, which becomes organized and converted into connective tissue, and as this shrinks later, the vasa efferentia or the canal of the epididymis are obliterated.

In support of the trauma theory, Hochenegg reported two cases; one in a man fifty-two years of age, in whom after a sudden fall a stinging pain in the groin was felt and followed six months later by spermatocele; the other, a boy of fourteen years, after lifting a heavy load, had a history similar to the above.

Princeteau, Verneuil, Krebs, and Bonneau reported spermatoceles following injury. In Bonneau's case it followed an operation for hydrocele. Krebs found trauma as a factor eight times out of fifteen cases.

2. *Sexual Abstemiousness*.—Cavasse reported the first case that gave rise to this theory, but it has neither strong clinical nor pathological support.

3. *Gonorrhœa*.—It is to be expected, of course, that to venereal disease would be ascribed a rôle in this condition. However, there is very little clinical evidence to support it, and yet why should it not be, particularly when the epididymis is involved?

Of the causes above named, trauma seems to be the most logical one, yet it must be of a peculiar variety, for injury to the scrotum is not rare, while spermatoceles are a curiosity. As before mentioned, it is quite logical to expect that gonorrhœa might be an etiological factor; however,

one cannot understand, in that event, why spermatoceles should not be as numerous as cases of hernia. In sexual abstemiousness, the overflow finds its way first to the seminal vesicles and then gains exit through pollutions instead of forming retention cysts.

Evidence has been produced to prove that spermatoceles are more numerous than suspected; Lewin found 8 of these cysts in 100 testicles of cadavers, while Hochenegg found 27 in 362 testicles of cadavers.

In the cases reported, the incidence seems to be equal on the two sides. They may occur at any age after the testicle has commenced to function.

*Classification.*—Von Hoffman divided them into intra-vaginal and extra-vaginal, though he claims that most of the extra-vaginal cysts commence intra-vaginally.

*Extra-vaginal.*—This variety arises from the vas aberrans superioris, from the vasa efferentia, and very rarely from the vas deferens and the paradidymis.

Those from the vas deferens and paradidymis are primarily extra-vaginal, whereas those from the other two, according to von Hoffman, become so by first occupying all the space in the ligamentum epididymis superioris, thereby displacing the epididymis backwards, and then they grow upwards in the tissues of the cord, when they become extra-vaginal. In this latter type of cyst the testicle is displaced downward and forward. The position of the testicle is unchanged in the variety arising from the vas deferens and the organ of Giralde.

The site of insertion of the cysts arising from the vas efferentia and vas aberrans is in the rete testis; from the vas deferens and paradidymis, in the cord. The extra-vaginal cysts are usually unilocular. If multilocular ones are found, they are probably due to several cysts arising at the same time. The extra-vaginal cysts are larger than the intra-vaginal, and in one case reported by Stanley, 49 ounces were removed at the first tapping and 57 at the second. These cysts are supposed to have a pear shape, which when seen is characteristic, but the larger cysts take most any form. When seen macroscopically, it is noted that the walls of the cysts are thin and that distributed in the sac walls are fibrous cords, which when the sac is greatly distended cause bulgings, giving the balloon shape described by Savariaud.

*Intra-vaginal.*—These arise from sessile hydatid, or the canal of the epididymis, and project into the cavum vaginale. That these cysts do occur at the hydatid of Morgagni was demonstrated by Hanusa, who found, during an operation for hydrocele, a dilated sessile hydatid, the size of a cherry and containing spermatozoa. As the walls of the hydatid are very thin, rupture into the cavum vaginale can easily occur, giving rise to a hydrocele containing spermatozoa. The intra-vaginal cysts become intimately connected with the tunica albuginea, and as they grow they take on the form of the globus major. It is this latter character-

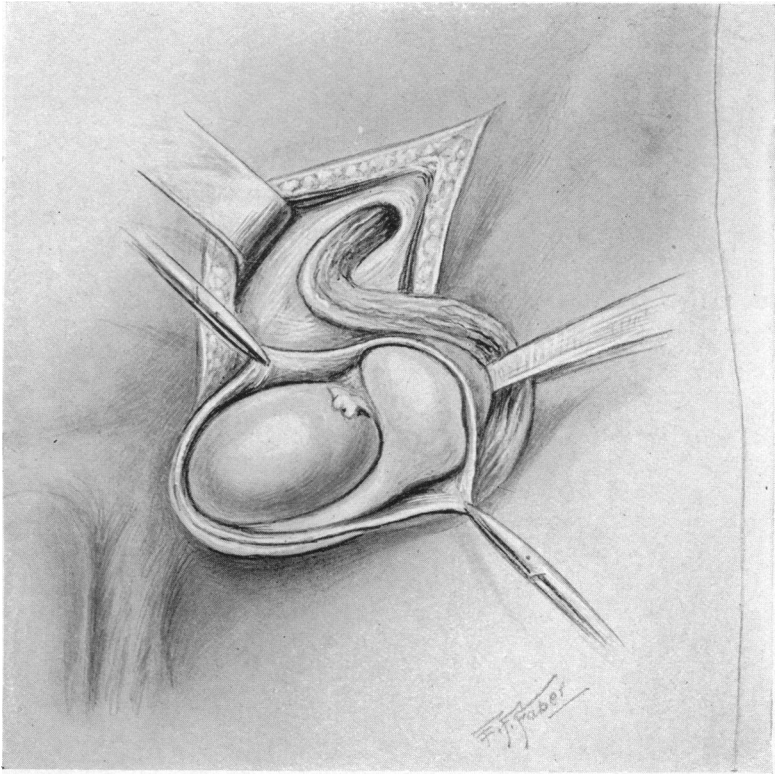


FIG. 2.—Sketch of the operation, showing the cyst at the globus major.

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istic that gives rise to the impression that there is an accessory testicle superimposed on the normal organ.

*Pathology—Structure.*—The walls of the cysts are made up of interwoven strands of connective tissue, among which can be found bundles of smooth muscle. These bundles arise from the smooth muscle of the vasa efferentia and the canalis epididymis, and when found, it is claimed, surely point to the presence of spermatocele. The cysts are lined with ciliated or cylindrical epithelium when recent; in the older varieties the lining is of pavement epithelium.

*Contents.*—The contents are usually milky or soapy in color. On microscopical examination lymphocytes, fat globules, epithelial cells, and spermatozoa are found. The spermatozoa may be rigid or mobile, and in the cysts arising from a testicle which has become senile the spermatozoa may be absent. The fluid is feebly alkaline, has a specific gravity of 1.002–1.006, and contains 0.2 to 0.5 per cent. albumin.

*Symptoms—Subjective.*—There is a group of symptoms, which though rarely found, is pathognomonic, namely, severe pain in the testicle and swelling on sexual excitation. In the majority of cases there is no pain, only a feeling of distress. The swelling or tumor is what is most complained of, and if this is a slowly progressive affair following trauma, it would cause one to be suspicious of spermatocele. A certain number consult a physician, believing they have a third testicle, and as Liston says, "flatter themselves in thinking they are thus unduly provided."

*Objective.*—Here, too, the only finding will be a tumor. In the intra-vaginal variety it is a globular mass sitting on top of the testicle, but as sometimes occurs in this variety, a hydrocele may be coexistent and the tumor will not be recognized.

In the extra-vaginal cysts, the testicle will be found displaced downward and forward.

*Diagnosis.*—The history of trauma, followed by a slowly progressive tumor in the scrotum, would be circumstantial evidence. If a pear-shaped mass is found with the testicle displaced downward and forward, the diagnosis of extra-vaginal hydrocele is probably correct, as is also the finding of a globular mass on the top of the testicle, indicative of the intra-vaginal cyst. Presence of spermatozoa in the aspirated fluid is not a positive proof, for hydrocele may contain these elements.

Hoehenegg resorted to chemical examination for differentiation of hydrocele and spermatocele fluid; spermatocele fluid, as stated above, is feebly alkaline, has a specific gravity of 1.002–1.006, and contains 0.2–0.5 per cent. of albumin, while hydrocele fluid is strongly alkaline, has a specific gravity of 1.020–1.040 and has from 4.4 to 7 per cent. albumin. No dependence can be put on the light test, as spermatoceles transmit light as well as hydroceles.

*Treatment.*—Aspiration, injection of irritants and incision have all been abandoned, as recurrences were frequent.

The radical operation is now performed. In the cysts arising from the sessile hydatid and the vas efferentia, a portion of the tunica albuginea must be removed and the defects covered with serosa. In the other varieties the cyst can be easily enucleated from its bed and the stalk ligated close to its base. If the testicle is atrophied castration is the logical procedure.

CASE REPORT.—L. O., aged eighteen years, male, white, was admitted to the Episcopal Hospital September 12, 1916, and discharged September 30, 1916.

*Family History.*—Negative.

*Past Medical History.*—Has not been ill since childhood. Denies venereal infection.

*History of Present Illness.*—For the past six years the patient has noticed sagging in the left scrotum, and for about the same period has noticed a tumor attached to the testicle. At first was the size of a pea, now has grown to the size of a walnut. On account of the tumor the patient was given the nickname of "Hock Shop." Never any pain in the testicle nor any interference with genito-urinary functions. Comes to the hospital to be operated on, as he wishes to enter the Navy and has been rejected because the Navy doctors said he had a "third testicle."

*Physical Examination.*—Scrotum: Varicocele left side. Attached to upper pole of left testicle at the site of the globus major, is a mass the size of a walnut. It is firmly attached to the testicle, and pressure over the mass is transmitted to the testicle. A diagnosis of spermatocele was made.

*Operation.*—September 15, 1916. Operator: Dr. A. P. C. Ashhurst. Assistant: Doctor Crossan. Incision over left inguinal canal three inches long. Fascia of the external oblique is split and the testicle delivered into the wound by traction of the cord. Tunica vaginalis seemed to be slightly distended and did not show any masses on the external surface. Tunica vaginalis is then opened and a few drachms of clear, straw-colored fluid evacuated. Tunica is split throughout its whole length, and it was then ascertained that the globus major showed a cyst the size of a lima bean. This was aspirated and about 4 c.c. of a milky fluid removed. The walls of the cyst were then opened. On opening the wall of the globus major it was found there was another cyst wall inside of it at a depth of 0.5 cm. This was dissected free and removed, having no dense adhesions. Portion of the wall of the globus major is removed for examination. Remainder is closed with No. 00 chromic catgut. Before the above procedure a small portion of the tunica vaginalis was removed at the upper angle. The tunica vaginalis is then closed with No. 0 chromic interrupted gut. It was impossible, however, to make the edges meet at the upper limit of the sac. Testicle and its covering are replaced into the scrotum. Varicose veins separated from the remainder of the cord and divided between ligatures, a length of about 6 cm. being excised, and stumps



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approximated by tying the corresponding ends of the ligatures. External oblique is then closed by continuous No. 1 chromic catgut. The skin with No. 0 lock stitch of chromic gut. Dressings are then applied.

October 30, 1916: Discharged. Testicle is still swollen and tender on pressure.

*Pathological Examination.*—1. Cyst wall: Fibrous tissue wall, lined with columnar cells.

2. Fluid from cyst: 2 c.c. in amount, contained two spermatozoa, specific gravity 1.050.

*Further History.*—Patient was seen on March 2, 1920, at which time it was found that there was an atrophy of the left testicle. The latter was reduced to a mass  $1\frac{1}{2}$  cm. long by 2 cm. wide. The above unfortunate occurrence was probably due to some impediment at the globus major completely obstructing the semen-carrying system. Briaud produced a similar condition in rabbits by ligating the vas deferens.

### SUMMARY

Spermatocele is a retention cyst of the scrotum which is or has been in communication with the semen-carrying system. The cysts arise most frequently from the vasa efferentia, the vasa aberrantia superiori, and the sessile hydatids. The main symptom is swelling, with sometimes a history of previous trauma.

I wish to express thanks to Dr. A. P. C. Ashhurst for permission to report the above case.—AUTHOR.

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